



**FACULTY OF SCIENCE**  
**Charles University**

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## OFFER

We offer our expertise related to molecular and cellular biology of yeast, with an emphasis on investigation and environmental resistance of multicellular populations such as

- biofilms,
- populations of natural yeast strains,
- immobilised populations.

## KNOW-HOW & TECHNOLOGIES

- The development and differentiation of yeast colonies, a model of simple multicellular organism.
- The function and regulation of processes involved in development of specialized colonial cells similar to cells of solid tumors of mammals.
- The differentiation in structured biofilm colonies of natural yeast strains.
- The regulation of mechanisms involved in resistance of yeast biofilm colonies and biofilms against environmental attack (including drug treatment).
- The development of new approaches to study multicellular structures.

**We are looking for cooperation with public and private organizations in the field of molecular biology and microbiology related to analyses of multicellular yeast populations.**

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**Our mission is to perform high-quality fundamental research, internationally considered as top research in the field.**

**Our aim is to identify the processes involved in the formation, development, differentiation and ageing of yeast colonies and biofilms.**

### MAIN CAPABILITIES

- Genetic, molecular biology and biochemistry techniques, including yeast strain modification (e.g., construction of knock-out strains, genomic fusions with gene tags etc.), DNA, RNA and protein analyses, microarrays, amino acid quantification (HPLC), different cellular staining, flow-cytometry and others.
- Special techniques for studies of multicellular populations including two-photon excitation confocal microscopy for *in situ* analyses of population architecture and differentiation, cell micromanipulation and separation and others.

### KEY RESEARCH EQUIPMENT

Microscopy and macroscopy specialized for the investigation of multicellular communities, standard equipment for molecular and cellular biology, biochemistry and microbiology.

### PARTNERS AND COLLABORATIONS

#### ACADEMIC PARTNERS

Institute of Microbiology of the CAS (Laboratory of Cell Biology; Prague, CZ) | Oslo University Hospital (Ullevål) (Dept. Medical Genetics; Oslo, Norway) | Institute Jacques Monod CNRS, Paris, France | University of Tennessee, Memphis, USA | COST network "Proteostasis" BM 107

#### PRIVATE AND PUBLIC SECTOR

Lenticats (CZ)

#### MAIN PROJECTS

- 15-08225s, Metabolic pathways and regulatory mechanisms responsible for vitality and longevity of cells specifically localized within yeast colonies, Grant Agency of the Czech Republic, 2015–2017.

- 7F14083, 3D yeast colony genomics: A model for cancer progression and development of drug resistance in biofilms, Czech-Norwegian Research Programme (CZ09), 2014–2017.
- 13-08605S, Biofilm colonies of wild yeast: Development, defense strategies and regulatory pathways, Grant Agency of the Czech Republic, 2013–2017.
- TA01011461, Immobilized yeasts in biotechnology: development of new applications for manufacturing, Technology Agency of the Czech Republic, 2011–2014.
- 204/08/0718, Role of ammonia signalling in yeast colony differentiation, development, age, survival: Molecular mechanisms and functions, Grant Agency of the Czech Republic, 2008–2012.
- 55005623, Multicellular yeast Communities: Signalling, Differentiation and Long-Term Survival, Howard Hughes Medical Institute International Research Scholar Award, USA, 2006–2011.
- LC06063, Fluorescence microscopy in biological and medical research, Ministry of Education of the Czech Republic, 2006–2011.
- LC531, Centre on molecular biology and physiology of yeast communities, Ministry of Education of the Czech Republic, 2005–2011.
- EMBO Young Investigator Award 2001 (YIP141) (EMBO/HHMI Young Investigator 2003–2005). "Studies of signals involved in the development of multicellular structures – yeast colonies".

### ACHIEVEMENTS

Czech patent: CZ 305223 „Method of modification of the detection yeast strain“ (2015) and publications in peer-reviewed and high-impact journals such as Nature, J Cell Biol, J Cell Sci, Mol Biol Cell, J Biol Chem, FEMS Microbiol Rev, EMBO Rep, Env Microbiol and Mol Cell. Results are regularly presented as plenary and invited lectures at leading international conferences and in prestigious Universities.

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